

**On the relationship between central regulation and the potential for local initiatives: some reflections on the growing scope for more and better research**

**Benvenuti B.**

*in*

van der Ploeg J. (ed.).  
Strengthening endogenous development patterns in European agriculture

**Chania : CIHEAM**  
**Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 23**

**1993**  
pages 21-38

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=C1000372>

To cite this article / Pour citer cet article

Benvenuti B. **On the relationship between central regulation and the potential for local initiatives: some reflections on the growing scope for more and better research.** In : van der Ploeg J. (ed.). *Strengthening endogenous development patterns in European agriculture*. Chania : CIHEAM, 1993. p. 21-38 (Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 23)



<http://www.ciheam.org/>  
<http://om.ciheam.org/>

## ON THE RELATIONSHIP BETWEEN CENTRAL REGULATION AND THE POTENTIAL FOR LOCAL INITIATIVES: SOME REFLECTIONS ON THE GROWING SCOPE FOR MORE AND BETTER RESEARCH

**BRUNO BENVENUTI<sup>1</sup>**

CESAR Centro per lo Sviluppo Agricolo e Rurale, Italy.

---



---

### **Abstract:**

*Benvenuti focuses on the paradoxical interrelation of a globalizing world and the simultaneous need for regional and local room for manoeuvre. He stresses that it is especially functionalist and/or structuralistic theories that are blocking the right kind of analysis that render visible the potential for local initiatives.*

### **Keywords:**

LOCAL GOVERNMENT, ECONOMIC SYSTEMS, RESEARCH.

---



---

### **Introduction**

Invited to deliver a paper on the relationship between central regulation and the potential for local initiatives, I commented to the organizers that this topic has been a focus for discussion under different guises in the social sciences throughout the post-war period. In fact, discussions about such themes as broad as centrum-periphery relations; authoritarian versus democratic planning; dependency; cooperation amongst farmers as well as nations; social organisations as well as state organisation, and a good many more fields of interest for a whole plurality of social disciplines seem to form a perennial hobby of our scientific forums.

As far as one can oversee the state of the art, it seems still far from having produced an uncontradictory body of knowledge. In fact, the theme is one of the most elusive and ambiguous even for current theories of democracy. I can hardly hope, therefore, to deliver here a clear-cut vision on the matter. Nevertheless, there is ample scope for drawing the attention of research workers to certain dimensions or aspects of the topic that have seemingly acquired a renewed relevance within the development trends of the last years.

---

<sup>1</sup> The opinions expressed in this document are solely the responsibility of its author. The latter is grateful to Drs. R. Agelink of Amsterdam University and to M. Miele and G.L. Brunori of Pisa University for their comments on a previous draft of the paper.

### **Talking of central regulation, free market, participation, rationalisation, the Economic System, tailor-made technology, 'professional' agriculture and similar Jack-of-all-trades concepts**

Let me start by recalling three vicariously related facts.

First: On top of existing theoretical insights, the very macroscopic historical experience of these last years of former Eastern Block European countries shows by itself quite concretely that, notwithstanding the amount of allegedly available power, central planning becomes increasingly difficult, counterproductive, and in the end utterly impossible because of the rapidly growing scale and complexity of the systems or processes in question. And hence (thus declares the rather trivial dominant version of facts), at the theoretical level even less than at a practical level, valid alternatives to the market economy system are still far from being perceivable at present. And, to make the simplification even more incisive and easy-going, this said system is handily labelled as 'free market'.

Second: It is a sad acquisition that, in spite of a lot of good intentions, wishful thinking, and generous personal efforts on the side of whole squadrons of social scientists, technicians and animators in the field, so far most attempts at furthering autochthonous/endogenous/bottom-up local development have generally had a hard time surviving even for a while - let alone having had the time to consolidate or further prosper as such. And because of this tendentially steady negative outcome, scientists who uphold the current deterministic view that the legitimacy of any scientific concept, theory, world-view or procedure depends on its assessed capacity to function (to 'work'), tend to deny the legitimacy itself of socio-economic and socio-political theories based on concepts of the above sort. In the opinion of such scientists, it is far better to put the whole idea of autochthonous development out of one's head. But a second notion - that proves very hard to get into the heads of the addicts of positivism - is the 'tautological' character of many feed-back mechanisms of the social construction of reality. And positivism fares quite well amongst the present technosciences (I will come back later to the social sciences).

Third: It takes little to conclude that the generalized failures to launch locally based, self-sustaining development can be seen neither as a random effect nor as the result of unavoidable natural laws like gravitation, or Einstein's general relativity. However, the dominant disciplinary socio-economic and socio-political paradigm shows contemporarily a truly curious and remarkable lack of interest for gaining a well underpinned knowledge of the cause of such near-to-systematic failing. In this regard one can actually speak of the existence of a kind of 'black hole' of 'respectable' (canonical) scientific knowledge. Then one is tempted to wonder whether this void of theory is in turn purely casual or whether it can be seen as (a manifestation of) some kind of selective affinity with the major practical developmental tendencies of western society (or as a "theoretical co-variation" thereof).

I will summarise my basic feelings regarding the above set of questions with three different considerations.

First: Be it as it may, the three facts recounted above have so far manifested a clear functionality to the views presently dominant - if any, in sheer quantitative terms - at the politico-economic and technological level in diffusing and imposing one and the same market economy model, as well as one and the same development pattern. That is, even when the principle of the primacy of economic expansion at all costs is mitigated in the public ideology by one or another smoke screen, at present the public legitimacy of an absolute priority assigned to economic expansion is still far from being successfully challenged by any opposite conception or theory of similar following (irrespective of the level of complexity or danger that this primacy might entail for present or future generations).

This implies that a teleology of 'The Economic System' has come into being and is being actively supported by those who expect to reap the most comparative rewards from this expansionism (its High Priests speaking now of 'the need' to consolidate an 'Advanced' Industrial System).

This system teleology can be distinguished by two basic traits: On the one hand the image or notion of 'economic system' which inspires is defined more effectively by those who favour the teleology than by its possible opponents; and on the other, its nature has something of a new God-Moloch to which all must be sacrificed - just as the biblical Jehova could ask Abraham to kill his own son Isaac even against his deepest tribal ethics, so the High Priests of this teleology do not cease also to ask for legitimate independence from ethics<sup>2</sup>.

Second: As currently stamped into the public's heads by an uninterrupted multimedial 'barrage', in the former view economic expansion 'needs' wide and constantly expanding economic spaces and division of labour, which, in turn, increasingly 'demands' coordination processes and structures, displacement of labour force, destruction of capital, of know-how and of nature, increasing R.&D. to the sacrifice of other investment goals - and still more. Consequently, the economic system, together with this expansionist view 'requires' growing and increasingly specialised (read: fragmented) institutional and individual inputs. By the same token, such an economic system is forced to rely more and more on the formal dimensions of social relations, on formal institutions, formal definitions of roles, formal agreements and channels, formally defined economic spaces and - last but not least - whole arrays of ad-hoc, deliberately formalised scientific and professional knowledge. Of course this is not to say that in

<sup>2</sup> Which means that The Economic System - with its 'advanced' variants and corresponding economic ideology - has emerged as a kind of vulgar secular religion propounding the ethical autonomy of 'the' economic dimension of life from the wider spectrum of other moral dimensions constitutive of a given social context (as well as from the still wider gamut of existing social contexts. In this sense Marxian ideology has the same function). For examples on the occasion of his recent proposal for the constitution of a great North American Free Trade Area, President Bush decided that: "the principal challenge facing the U.S.A. now is the competition in a global market that changes and expands rapidly." (Corriere della Sera, AUG. 13, 1992, translation B.B.). That is, a 'free' trade area strongly expansionist towards the exterior, thanks to ad hoc institutional means, and strongly protectionist towards the internal market due to a corresponding set of institutional measures.

such an economic system informal relations, informal arrangements and in general the informal dimensions of life have disappeared. But it is a fact that in this system the increased role of science adds preponderantly to its formal dimensions and processes. And while most modern scientists seem to assume that this fact is a natural and necessary (in the sense of natural science) outcome of the situation, the imperative nature of the correlation in question is still far from being proved or even seriously examined. Yet such a kind of development is more and more consciously planned - a planning activity forming directly or indirectly the basis for the existence of growing armies of scientifically trained personnel in widening numbers of disciplinary fields.

Eventually, while being theoretically incompatible with the practice of a centrally planned, monolithic, economic order, this aggregate of formal systems and subsystems (System of Systems) has actually replaced that practice in an official sense by a praxis of extensive social regulation of a softer form, with a concomitant blossoming of vertical flows of orders on a widening front of interactions and relations. More specifically as far as the economic sphere of action is concerned, the free market of our textbooks has pervasively gone over into "managed trade" within so-called Free Trade Areas in which the techniques of 'the (large) Firm's Planning' emerge as a most effective form of coordination and structuration of inter-industrial relations<sup>3</sup>.

As far as farming is concerned, this organisational trend means that in the present development model the interests and goals of the firms and companies constituting the industrial pole of the Agro-industrial System (a fast growing subsystem of the Economic System) lie not only in the establishment of new sales markets and large distribution networks setting out explicitly their norms of functioning<sup>4</sup> - but, also, in the parallel creation and diffusion of a so-called Integrated Agriculture<sup>5</sup> whereby industrial inputs and especially the newest technologies dictate the manner of farming. In fact, as such, the growing complexity of scientifically produced technological packages reveals an increasing 'definitory potential' (Benvenuti 1992) upon their adopters; also, in general, a new relationship in the agricultural sector is being developed which can be called increasingly prescriptive (Ruivenkamp 1992) both directly and indirectly. That is, in the development model represented predominantly by Agro-industry, the former dialectic between central regulation and local potentialities or 'space for manoeuvre' has been

<sup>3</sup> The most developed planning form emerges with the diffusion of so called Long Range Planning as an instrument which "does not limit itself to extrapolating the future from existing trends, but to developing conceptual instruments, such as the life-cycle of the product, the curve of experience and the hypothesis of profitability and cash flow from the range derived from the portfolio analysis." (Di Benedetto, Rullani, 1990, quoted in Sodano, 1992, free translation B.B.).

Summarising a rather plethoric literature on the theory, metatheory and philosophy of the State, it must be noted that generally speaking central regulation is mostly seen/discussed in connection with a formal/jural notion of the State. However, in our complex societies, the share of such a State in the 'total amount' of existing collective regulation obtained in/by the societal body decreases sharply compared to the regulation obtained by the power strategies applied by a constantly growing number of other collective actors.

<sup>4</sup> Whereby we are visibly sailing towards a (potential) suppression of particularities of time and place in both agriculture and diet because the continuous expansion of sales 'requires', in its turn, an increase in distance as well as in durability of the allocated goods.

<sup>5</sup> Which for the same money could also be called 'disintegrated', 'destructured' or 'uprooted' as well.

transformed into a double-edged structuring principle: prevailing top versus down relations on the relational dimension, coupled with prevailing prescriptive versus servicing functions on the functional one. Hence, normatively speaking, a top-dogs' perspective is gradually prevailing as the overarching logic in/of the Agro-industrial System, which, again, seems to be considered as a kind of necessary condition for a 'professional' agriculture by enlarging numbers of agencies, opinion leaders, and even scientists of the sector. And, by a sleight of hand, a concept of professionalism is thereby imposed on farmers, which is the opposite of its orthodox meaning.

### **Where do we go from here?**

Thus we are back again at the beginning of our story. The situation described so far is probably becoming increasingly familiar to most of us. But if we want to improve upon it, how concrete for the moment can the necessary indications be? I wonder whether such indications can be found at all, if the quest for immediacy should make us bypass a series of important side-tracks, all of which eventually lead, in my opinion, to the central theme.

To ease a discussion that threatens to become too burdensome it might be useful to take the cow by the horns and refer to an ideal situation:

*"If political democracy means the right to participate in political decisions that affect us, economic democracy means the right to participate in economic decisions that affect us. And by economic democracy I mean.....not just veto power over technologies that someone else has already developed, but the right to participate in shaping the directions that science and technology take." (Kloppenburg, 1991: 482).*

Not only is it obvious that such a control does not exist at present, but if the former conditions were reasonably met, there would not be much scope for discussing further our present topic. In fact, central regulation and potential for local initiative would have automatically reached some kind of 'optimal' equilibrium in a smoothly self-governed social aggregate.

In the meantime, the increasingly decisive role of R.& D. and of science at large in this lack of people's control upon the directions taken by the evolution of the socio-economic order, becomes every day more visible and documentable<sup>6</sup>. And since the impact of science on society keeps unquestionably growing, one may infer that the same holds also for the relation between science and the relationship between central regulation and the potential for local initiatives. Certainly there are also other factors in

---

<sup>6</sup> Which is the reason why, at this point, public discussion on the role of science and technology usually develop along two preferred paths. On the one side you have the ritual left-wing accusation of 'the standard view of science' revealing less and less ashamedly its ideological, epistemological, and financial bondage to 'capitalism' (recently integrated with 'State capitalism'), and on the other the more sober admission that the situation is due to the fact that in the last two centuries the main spring coaching and shaping concretely the process of technological development has incontestably been the old logic of profit and power. No matter how I might sympathise with either position, the ritual itself of this kind of discussion frequently hinders a view on, and an understanding of other relevant dimensions of the problem, both external and internal to scientific practice.

that play, but quite probably science will soon influence them too. Hence, the question 'which science?' is doomed to acquire an increasingly focal place in this discussion. That is to say why it is that all scientific attempts to work out anything but vaguely in the line of a 'project' or 'proposal' for possibly attaining a more balanced relationship between central regulation and potential for local initiatives, cannot avoid paying growing systematic attention to what is conventionally called science. A step in that direction will be undertaken in the next section of this paper. Yet, before getting that far, let me deal immediately, by way of introduction, with a kind of "perceptual trap" (disciplinary? paradigmatic? emotional? 'mass product'?, call it what you like) not uncommon these days in the social sciences at large.

Among those who object to the present techno- and power-centric view of social development, the principles of doing research 'with the people' and, later, 'by the people', are becoming popular - particularly amongst 'progressive', left-wing research workers, as if this were, beyond a necessary, also a sufficient condition to counter the development tendencies to which they object. For some 'schools of thought' it seems already almost a tenet for shunning or accepting colleagues; but I am afraid it is largely insufficient and most probably also dangerously illusory if it were thought to be all that there is to say and to do *within* (I stress within) science for altering - not to speak of reversing - the present trend.

Why illusory and why insufficient? Of course I am not saying that research 'with' and 'by' the people is not necessary and should not be done - quite the contrary! Only, if left at that, the expression simply becomes a slogan, a stereotype implying a superficial re-edition of a worn out old phobia: 'on the other side of the barrier' there exists the Big Power's Plot; and all one needs do is...undo the damn thing. Unfortunately, things are somewhat more complicated than that.

Why then insufficient? On the one hand it is true that, for example, the present nonconventional, non-sustainable, non-regenerative, high-inputs and homogeneous agriculture is in fact the product of the diffusion and generalisation, at both individual and collective level, of standard organisational models, standard technology, standard procedures for action, and standard know-hows allegedly 'required' by the Fordist view inherent in the dominant System Teleology. And it is also true that the 'malleability' of society is inversely proportional to its scale - which means that, particularly at the local level, likewise the number of negative results originated elsewhere is, on the contrary, directly proportional to this scale. And could, by any chance, our predominant research style be one of the factors contributing somehow to this state of affairs? Scientists who object to the latter should ask themselves - to begin with - how come that the majority (there is no doubt about that) of their research colleagues not only collaborate in good faith with this massive and multi-level standardization effect but, beyond that, quite often do not even perceive the potential for development inherent, in principle, in heterogeneity as such. Or, even worse, do not perceive heterogeneity at all, are in fact annoyed when they happen to discover its existence, and do not see much that is worthwhile in specificity. Here there is probably something not well 'digested' in their scientific nutrition: for striving to increase the general *validity of knowledge is one thing, and seeking to impose universality in the ontological construction of society is a completely different matter.*

For, in fact, how many well intentioned, self-perceived and self-labelled liberal, left-wing, or even 'progressive' scientists practice, knowingly or not, a reductionist science? I am afraid that the answer would be deceptively high. And, under such conditions, even doing research 'with' or 'by' the people at best will remain a rearguard fight. Or else the result ends in another kind of system teleology - with its High Priests and its watchdogs.

But then, if we suspect that this would be the outcome, the discussion needs to make a qualitative leap. From the level of good intentions and social labelling, it must be lifted to that of the scientific conception consciously or unconsciously *de facto* adhered to. For it is clear that, if the global outcome of the present standard scientific exercise is the strangling of local potentialities, then in order to avoid it one must start disposing of a better, fuller and less unilateral science.

Yet I am convinced that, even then, one would not have reached the necessary and sufficient conditions. It must be stressed that there are certainly at least two more dimensions that play a decisive role for the present topic: two dimensions that in the short run might even emerge as more difficult to correct than a scientific personal conception and a scientific paradigm - and that must be reckoned with.

The first of these pertains to the moral order, and therefore it concerns primarily the people themselves to whom we ought to relate our research endeavours. In fact, in order to be reproduced and give the expected results on a significant scale, the present spread of standardisation and homogenisation processes must be accepted in the end by the concerned actors/producers at large. And the hypothesis does not seem too far-fetched that the bulk of our farmers, rural artisans, and other actors performing the gamut of specialised professional roles that constitute the TATE, or Technological-Administrative Task Environment of the farm enterprise (Benvenuti en Mommaas 1981; Benvenuti *et al.* 1992), generally speaking, perceive the ongoing multi-level standardisation and homogenisation of their farm-internal reality as an effective, visible and rational means to maximise the economic utility of their own professional activity - whereby this utility is intended *uniquely or predominantly in a strictly monetary short-term sense*. And while this hypothesis can easily be falsified in individual empirical cases, there still can be little doubt that at the public, 'cultural' level of the economic sector, this multi-level standardisation and homogenisation process (of the use of technology, organisational patterns, calculation procedures and professional know-how) is currently proposed as a matter of fact; and that - whenever emerging as 'necessary' - its imposition on the agricultural producer is legitimated as a convenient recipe for obtaining a higher 'day after' output of monetary utility. Such a structural-functional mechanism is presently at work in every technological sector of 'professionalised' farm management - from animal feeding to fruit sorting; from automated management to insurance practices.

Therefore, I am afraid that until the concept of utility broadens enough to include also other dimensions of our global reality, the fact of standardisation and homogenisation as such will substantially maintain its present rationale and its tendentiously

expansionistic and totalitarian character<sup>7</sup>. Here lies therefore a second field of action for any moral movement supporting the cause of locally based forms of development and well being.

The other, and third strategic dimension, in my opinion, has an explicitly political (politico-economic; politico-institutional) character. For, even if the two former dimensions should be sufficiently attained in principle, they could scarcely be expected to yield sufficient help to the a-priori increase of potential for local initiative if their politicoeconomic context is still that of the 'free' (read: vertically managed) trade areas we know presently throughout the world.

What are the potentialities for local development? On paper the answer appears decisively easy: since we presently live in these free trade areas and in 'free' markets strongly regulated by the planning activities of (coalitions of) commercial companies, the expression "potentialities for local development" can abstractly indicate two opposed ideal typical situations (let us not consider in-between cases for charity's sake). On the one hand you may have enough local availability of products and/or of factors of production exactly 'fitting' the plans of the companies qualitatively and quantitatively. Which is, in fact, the meaning attached to the idea of 'local potentialities' by the System's top-dogs. Well, in a turbulent world, company plans can change almost overnight; or they can imply extreme subordination for local decision making; or extremely low remuneration for local labour and other production factors; or, such plans can imply that the companies concerned are interested only in a minimal fraction of the local potentiality, so that - at best - the result would be a strongly unilateral growth. I need not dwell on this example. And I would not even mention it if it was not that it serves to clarify how also the expression "potential for local initiatives" can be - and currently is transformed - into a Jack-of-all-trades concept. Once again, this presupposes an alertness for taken-for-granted definitional and epistemological questions by those who try to tackle practically our type of problems.

Then you have the second, opposite situation: i.e. there exists locally a given aggregate of products and/or production factors that must be utilized to their best for the present and future local population. What really needs developing in this case is first of all

---

<sup>7</sup> Assumed as a structuring principle, economic utility in a narrow sense becomes soon a calculus of the 'scientifically anchored' economism that labels as 'disorder' or 'irrationality' all structuration of reality carried out according to another rationale. E.g. this is quite clear in the recurrent campaigns for the 'modernisation' and/or 'rationalisation' of farming seen from the (economic utility of) Agro-industry. However, Reason - the rationality criteria - is an historical product, which evolves during/because of the very process of the social construction of (at least a very substantial part of) reality. According to the classical utility notion as theorized by such authors as Jevons in G.B., Walras in France/Switzerland and Pareto in Italy/Switzerland, economic utility expresses a point of balance in the rates of exchange between the desired good or service and the good or service to be delivered in exchange for it. Hence, in that model, economic utility tends to decrease with the growing availability of the desired good or service. However, even in this sense - referring to a mechanistic and 'instant' type of market - the concept has been amply falsified by our 'managed' markets. And, apart from that, if intended in a narrow monetary sense, 'economic' utility tends to frequently increase, or to render its object more desired, when the amount of money connected with its disposal grows, an effect which "legitimizes" sacrificing other dimensions of individual and collective life.

sufficient, sufficiently skilled, and sufficiently non-canonical research about the way(s) to do so. For, if science today is capable of shipping people into and around the cosmos; of filtering cosmic rays and splitting or fusing atoms deep under mountains in giant laboratories; of grafting animal organs into humans and even creating so far non-existent living nature, it can surely find the way to utilise rationally to its best almost any chance aggregate of productive factors.

However, it takes little reflection to conclude that if this first condition were satisfactorily met, one would also have to build and guarantee a purposeful institutional apparatus in order to ensure sufficiently the practical realisation, locally or regionally, of what the research programmes might have indicated as feasible. In other words, one would have to conceive and pursue an outspoken institutional policy to let the new local productive arrangements - 'misfitting' in the pre-existing politico-economic order - consolidate and gain enough economic space, even if this might imply running counter to the common official policy of the day.

The possible applications at the different levels and sectors of local well-being are doubtless all but negligible. Within the agricultural sector one of the simplest possible provisions could, for example, consist of renting out land in selected areas to farm tenants at reduced rents with clauses in their agreements for "well-crafted land", thereby formally acknowledging that well-crafted land can be obtained differently in different localities and regions of the same country<sup>8</sup>; and that the art of 'well-crafting' the land, together with the variations therein, constitute one of the political options on which to base the development of local potentialities. However, this simple recognition implies having an eye for 'well-crafting' the land; acquiring or developing the knowledge, insights and technology specific to the case; being ready to honour it and operating in such a way as to prevent it from being torn apart and 'homogenized' by the steam-roller effect of the dominant technological-organisational model.

Many of us agree on the need to develop ad hoc research programmes for this specific aspect of the problem. Where I am less convinced, is that this simple recognition is no guarantee against ritualized 'fact finding', paradigmatic blinkers, and the methodological sterilization against the specific or, on the contrary, the hypostatization of an atomistic view on social life. All of which can rely on a solid tradition within the canonical subdisciplines applied to rural life.

---

<sup>8</sup> The concept itself of well-crafted, together with its specific ways and means, belongs to local farm-professional epistemology. The example \_ one in a thousand possible \_ therefore lends itself to instructive reflections. In fact, there exists already within the EEC an incipient special regulation in favour of "typical" and "quality" products, which would seem coherent with the goal exposed in the text. However, contemporarily there exists a problem with the definition of such concepts. Or, more accurately, the problem is that of establishing the legitimate bases for those definitions. Should such bases finally be found in/allocated to the sort of criteria and knowledge employed by the food industry, the sense of such concept could be miles apart from that existing in the art of the locality.

### And what about science?

The preceding pages have already touched upon some actual or possible roles of science-based technology, R. & D., and of science in general. Meanwhile the discussion has reached a sensible tempo elsewhere. The Science Studies Unit of the University of Edinburgh, U.K., and the related *Social Studies of Science Journal* are focused systematically on it. Also professional rural sociologists are, of late, getting into motion with essays (e.g. Marglin 1991) or lively debates in *Rural Sociology*, such as the one between Jack Kloppenburg Jr. and Molnar *et al.* and Flora (*Rural Sociology*, Spring, 1992). À propos the new biotechnologies Kloppenburg wonders whether:

*"the companies and the Universities and the scientists and the technocrats who have given us a conventional agriculture that is non-sustainable, non-regenerative, high input and homogeneous now use biotechnology to give us an agriculture that is alternative, sustainable, regenerative, low input and diversified?" (Kloppenburg 1991).*

Having answered negatively his own question (because the companies cannot subsist without wanting to expand their sales of pesticides, fertilizers, licensed technological innovations etc., to farmers) the author embraces wholeheartedly the idea of finding the remedy in doing research "with the people". And when Molnar *et al.* cry out outraged that "there is only one science" (Molnar *et al.* 1992), he answers with equilibrium that (synthesizing the basic features of his position): a) his stance does not imply that existing science does not produce useful and workable knowledge; b) the problem is not that scientific and technical truths are relative, but that they are partial; c) that in the stance of his opponents real agency is denied to anyone but scientists; d) that sensitivity to local conditions is precisely what existing science is epistemologically and structurally predisposed to neglect; finally that e) there are multiple ways of knowing the world, and we need to embrace the full range of potentials contained in that diversity (Kloppenburg 1992).

However, no matter how firmly I agree with such conclusions, I find that the discussion has left out substantial aspects of the problem. For it is the process itself of diffuse, steady 'scientification' of society and its visible relations with the dominant development pattern, that emerge *per se* as an increasingly central matter for reflection within the context of the present topic. For instance, when Kloppenburg opens his statement by acknowledging that "scientific rationality has achieved *de facto status* as the modern epistemic hegemon, the standard against which all other knowledge claims are compared" (1992) he omits to clarify whether he objects to this state of affairs because he finds this scientific rationality at present too narrow and hence reductionistic (the position I hold), or whether he thinks that all possible sorts of knowledge are, as it were, 'equal'. All the same, after having assessed that "in many places the constitution and character of existing science are being challenged as people come to recognize that the dominant mode of knowledge production does not necessarily serve their interests or meet their needs" at the end of the same writing in answer to Flora, he attributes this effect to the hypothesis that "existing science is bound to capitalism ideologically, epistemologically, and financially". I would qualify this conclusion as too hasty (see the

'heaven' formed by the countries of scientifically realised socialism up to some years ago). But it seems true that, as I register elsewhere in this paper, the *presently dominant scientific styles* are as yet inspired by profit and power and that this explains at least a good deal of their unmistakable reductionism.

Science has long since ceased to pretend to be the source of wisdom and has become an instrument and a common component of our daily life. But what has thereby been gained in terms of quantitative normality might have been traded off in terms of quality of life or in other terms<sup>9</sup>. Speaking of the quality of science, among the new scarcities that our scientific world might so light-heartedly be creating, could be the intellectual and methodological bases of our college graduates. For example, one of my frequently recurring impressions is that within the mass-produce of scientifically formed personnel and research workers, there grows alarmingly a group of them who remain totally unaware that they are actually reducing themselves passively to the role of blind instrument of external goals. And it is obvious that a growing impact of 'scientifically-based' interventions by such personnel does not promise a very rosy future for mankind.

In order to safely start with the following reflections, I can happily refer to a very significant case with which most of us are already institutionally acquainted, Dutch agriculture. All I need to do is to 'unearth' more or less pedantly some significant questions that - as it were - lie behind it.

In spite of the growing impact of modern technosciences, the art of the locality is a phenomenon that has not yet disappeared completely in most parts of rural Europe. The usual technocratic interpretation of this phenomenon - if and when at all perceived - is in terms of 'deviation' from the norm, and its causes are sought in taken-for-granted resistance to change, lack of adequate know-how and information, survivals from the past, and similar low-level 'scientific' explanations. Quite different conclusions are to be drawn instead, if one realizes that technology shares many typical traits with language(s). Thus, an art of the locality reveals itself as a kind of technical-professional 'logic' or epistemology deriving from an active group life - a product available, in its turn, for exerting a sensible function on the social production of local specificities (but not necessarily a mere re-production of the old).

There can be little doubt that among contemporary European farming systems, Dutch agro-industry is probably the one that has been the most deeply and longest exposed to a so-called process of rationalisation - an expression implying *de facto* not much more than a quick technological, structural, and organisational change guided along extensive and deliberate steps in a process of homogenisation, standardisation and

---

<sup>9</sup> The fact is that it becomes increasingly difficult and illegitimate to speak of science as a unitarian phenomenon. E.g. for certain purposes it is certainly theoretically rewarding to make a distinction between science - research - scientific institutional settings and apparatuses \_ types and aggregates of knowledge \_ and types and aggregates of technology. Yet on the other hand, each of these categories in turn increasingly influences the others, so that 'science' can still be said to be a specific complex of social productions. And we have just seen, that there are scientists who hold that "there is only one science".

formalisation of various levels of the social organisation of the sector according to a logic of profit and power - all of which are safely rooted in and legitimated by scientific research (of different kinds). Nevertheless, extensive, empirical sociological research carried out in the last years has revealed even in such a 'streamlined' setting:

- a) the existence of statistically significant differentiation in farm management styles within the same production branch as well as within the same external natural and institutional setting;
- b) that for each management style, the farmers concerned actively and deliberately pursue, produce and reproduce the same (style), according to a specific rationale which functions as structuring principle;
- c) that the endeavours of agronomic R.& D. and other applied sciences and all the associated effects of standardisation and formalisation effects, as the norm match quite preferentially a selected group of farms labelled as 'vanguard' by State policy;
- d) that managers pursuing other styles must compensate for the comparative lack of scientifically produced and tested technological and organisational recipes and insights with their own personal inventiveness, and their own professional experience and high-quality craftsmanship (van der Ploeg 1990; van der Ploeg *et al.* 1990; 1991a; 1991b; 1991c; 1992a; 1992b).

This proves in my opinion how active and fertile agrarian professional local epistemologies can be if they can prosper in spite of the contrary influence of a heavily scientifically 'rationalized' agricultural sector. In fact, reductionist science and its products tend to operate as steam rollers over local farm styles/epistemologies; and it takes deliberately pursued craftsmanship to resist such an influence.

It is worth stressing that the Dutch Agro-industrial System is certainly one of the most 'research trodden' farming systems in the world - yet trodden by a research style that has been remarkably blind and/or idiosyncratic, since the above results have come, by and large, as an unexpected surprise to the official Dutch research establishment.

It might not be superfluous to stress that the difference is due to the fact that the research programme of van der Ploeg *et al.* is focussed on epistemic diversity (on purposely assessing and bringing it explicitly to the fore): a preoccupation thoroughly absent from the standard agronomic research of the country. (Let me note en passant how infinitely more nuanced should the authoritarian positivistic slogan "there is only one science" be. Which might eventually become true only if you duly enlarge the concept itself of science).

In my opinion the strategic importance of the above research results can scarcely be underestimated. Taken as such, they indicate that - except for situations of overt political compulsion - an adequately developed individual craftsmanship emerges as an instrument capable of defeating almost any sort of socially sponsored, would-be technological determinism. But there is also a further sense in which their importance remains central for the present topic. Namely, as a first hand reaction one might be tempted to conclude that analogous situations should theoretically be as frequent - if not more frequent - in other European countries where agronomic research, information

services, and the professional education of farmers and technicians are, or have been, far less systematically developed than in the Netherlands.

However, I wonder whether at the moment such a conclusion would not be premature and even tricky. The research results in question might also contemporarily express the influence of a specific set of situational variables, namely of factors such as the solid foundation of Dutch representative democracy and the altogether reduced force of paternalism and authoritarianism - implying a cultural tradition of the legitimacy to dissent from when "well intended self-interests" seem to be at stake; thus, the presence of wider possibilities for concretizing a range (or a larger range) of technical and organisational alternatives, favouring a re-evaluation and a re-appropriation of (consistent shares of) local knowledge by the modal farmer in face of the standard proposals issued by the national technostructure. For most of the peripheral rural regions of Europe such a set of situational conditions might be less pregnant both on the historical and on the cultural dimension. That is to say that the chances for a profitable utilization of the art of the locality may not result from deterministic technological 'machinery', but local conditions of the civic society can also lead with different intensity to the said re-appropriation of dormant local knowledge, in spite of the newest waves of disciplining the professional activity of farmers on the basis of a 'blend' of power and new scientific and technological instruments. But of course, even then, our problems with science would be far from finished.

In the last years the number of requests to the technosciences for an increase of 'tailor-made' technological production has grown substantially, thereby giving the impression that if only enough scientists would willingly give more attention and research time to this issue, the present, unlucky shortage in technological and cognitive terms for a good many farms would automatically be dealt with. As I hope I have convincingly argued, this expectation is doomed to prove a deceiving simplification of facts. There is more at stake than simple personal goodwill in executing one's everyday scientific work. In the end, formalizing concepts, theories, instruments, procedures, relations, etc. means deciding that *certain* aspects and dimensions of a given phenomenon are more relevant than others for attaining the desired results or tasks. And on the basis of this simple consideration one can arrive at some interesting insights. That is, that:

1. Most formalisations (concepts, formulae, algorithms, etc.) of common daily application within any scientific discipline are a matter of routine, whereas questions as to the reason and origin of the formalisation in question remain safely tucked away in the background.
2. Scrupulous and competent scientists should be permanently aware that most technological products, formal theories, concepts and formalised analytical and action-procedures are in fact tailor-made for the goals and the policies of the top levels of the Agro-industrial System; and that, by the same token, they come as 'ready made' or 'wholesale' products to the lower levels. Yet, even more decisive is the fact that, once a given formalised 'solution' (formula, model, technology, procedure, etc.) has been standardized and institutionalized, it is currently sold to/imposed on a large clientele, as being capable of also obtaining practical effects for which it was not originally intended. Computerized farm technology is a good case in point. Then, on top of this all, comes

the fact that the newest technological packages show a remarkable tendency to augment the 'definitory effects' they have on the conduct and/or the factual situation of their users (Benvenuti 1992)<sup>10</sup>. Competently formed technical and scientific personnel should constantly be aware of such practical effects.

3. Then, a special sub-category of the former type of problems is the role that the ongoing mathematisation and algorithmisation of science seems to play in the present tendency towards an accrued (algorithmic) 'compressibility' of the empirical world (Barrow 1990). And while I do not pretend to imply that such scientifically obtained 'compressions' are always synonymous with theoretical or methodological reductionism, the fact remains that they can easily fall into the category of a true scientific and scientifically-aided socio-political blend of reductionism (for further considerations about reductionist scientific exercise and local epistemologies see Appendix I from point three onwards). In other words, in producing tailor-made solutions to problems at the top levels of the social system, scientific reductionism is instrumental in bypassing and hampering the existence and value of empirical variety. And now comes the tricky point, about which any decent research worker should be keenly aware: In itself reductionism need not be the outcome of using formalised logic as such in scientific research. First, because there exists more than one type of logic. Second, because there exist also different ways to formalise probably any of them so as to avoid the production of 'compression'. Current examples of this can be found in so-called traditional cultures like the Hanonò of the Philippines (Benvenuti 1991). And third, because formal logic as such does not compress anything. It is the human mind which decides whether or not, when, and what part of the sensible world to 'compress', employing logic as an instrument.<sup>11</sup> And even in this last case the result of the scientific enterprise need not yet be compression in the usual sense of the word, if the result obtained is, instead, a higher explanatory capacity of a theory or concept, a deeper insight into and/or a better adherence to reality, etc.

This is already enough to maintain that reductionism can be said to result from extensively practised bad science, in the sense of the use in scientific research of standard formal logic:

1. being applied to the study of certain objects or themes in such a way as to actually prevent other objects and themes thereby connected in the local epistemology from appearing at all in the perceptual field of the research worker;
2. occurring more according to the definitions set by some Agencies with *de facto* or potentially higher influence than other Agencies; whereby

<sup>10</sup> Which means that \_ even apart from the capacity to put forward more adequate, less biased proposals - in theory a substantial share of the additional research input (1/3, 1/2, 3/4, 9/10?) would actually have to be invested in unmasking and undoing such manipulatory effects for the interested local actors.

<sup>11</sup> To give just a very current example: in the usage of algorithms the possible "compressions" of the world do not stem from the abstract fact of using this technique as such, but rather from the decision to apply it improperly (when it cannot be applied); from what part of reality one has left out of it; how the different elements composing the algorithm are defined and for what use; whether the results yielded by its application are intended in a prescriptive way or as a means to propose or elucidate possible options; etc.

3. choices pertaining rightfully to the realm of political discourse, are transformed into seemingly technical choices substracted from the voice of the actors concerned (a nice technique for having the latter grow increasingly 'peripheral' /powerless);

And, of course, the erasing of local epistemologies is most deeply connected - be it not wholly - with a 'scientific' exercise of this sort. In short, this is a question touching upon the very epistemological basis, conceptions and methods of science, hence trespassing the conventional boundaries between 'fundamental' and 'applied' or 'instrumental' scientific research. Nevertheless, at the practical level of everyday life, the consequences are macroscopic, because it is there that questions of funding, job security, career and prestige exercise a deep influence - often spurious - on the type and nature of research programmes, where 'research' is increasingly employed by the decision-makers as a useful coverage and legitimator for choices already taken, or to be taken anyway on other grounds.

### **Some minimal conclusions**

It is quite true that more and better scientific research would not suffice in itself to solve entirely the relationship between central regulation and the potential for local initiatives. However, it is also clear that 'bad science' as defined above means that a good many social actors (individual as well as collective, in the periphery as well in the centre) remain deprived of primary cognitive and material instruments necessary to reach the goals they might otherwise set themselves. And local specificities are thereby exposed to the danger of erosion. So are local professional symbolisms and epistemologies.

Hence - far from listening to the anti-science mermaid - more and better scientific research can be instrumental in changing both centre and periphery, i.e. more and better scientific research that adheres more fully to existing felt needs. By more and better scientific research (or scientific exercise altogether) I mean research that takes as its disciplinary perspective the pluri-dimensionality and global character of peoples' existence and related exigencies. Let us call it the perspective of the quality of life in order better to assess (discover or even re-invent, if needed) the correct role pertaining to politics, science and technology in the social construction and safeguard of this quality. For reasons of semantic erosion I would object to calling such an approach 'holistic' or 'constructionist' (Bunge 1991). However, more than the label, what matters is a systematic perspective guaranteeing that the double-edged problem of freedom and responsibility of the actors concerned does not vanish in the juggler's hat of some technological 'packaging' or, worse, in that of some research technique. For it is high time to admit that the exercise of Reason (with capital R) consists in having different forms of rationality cooperate according to the principle that none of them should play a dominating, imperialistic role.

A third point of relevance is the too narrow significance presently attached to the concept of economic utility by the dominant economic expansionist ideology.

Then, most probably, special institutional arrangements need to be provided for new, 'deviant' types of local initiative. In fact, opposed to the present conception aimed at the 'colonisation' and intensive exploitation of natural resources ending in short-term economic expansion, there would have to be a pattern based on different implications, a pattern which, in my opinion:

- favours long-term investments, discarding the principle of pursuing maximal profit in the shortest possible time;
- accepts the conservation principle, favouring the recycling and the intelligent usage of primary and renewable resources;
- supports professional conduct aimed at sparing and utilizing local resources;

In other words, a new kind of "social contract/covenant" needs to come into being, i.e. a covenant which explicitly concerns the relationship between development and habitat. It seems to me that these simple facts should be enough to show the sort and level of the intellectual demands that must be met successfully by those who endeavour to improve the potential for local initiatives. One needs also to stress the good old sociological insight that a paramount task of every new movement consists of creating its own well-furnished nurseries of new members. In this context I feel that more and special attention should be turned to the agencies of agronomic research and instruction. In fact, their present scientific status of whole or semi-intellectual ghettos renders them generally dominated by an old-positivistic conception of science which is impermeable to the possibility of admitting/perceiving any cognitive dissonance.

However, it is also true that such agencies potentially enjoy the best opportunity to perceive the steadily changing relationship between man and nature, and to perceive the need to pass from an exploitative to a cooperative type of relationship with nature. Quite probably this is one of the few fields of interest that can be seen as a kind of 'door' or bridge to allow new waters to stream into the old scientific bedplate of such Agencies.

Finally, having stressed the need to improve the professional level of scientific research personnel, one has to admit that, in principle, this need also holds for administrative and political roles. In fact, de-centralisation often transfers a great share of the most/more complex problems to the lower levels of official competence and keeps them accumulating there. Then, low-level local officers soon feel the temptation to call in the help of the centre, when one might expect a new round of the uprooting spiral to set in.

## References

- BARROW, J.D. (1990), *Theories of everything; Oxford University Press.*
- BARROW, J.D. (1990), Why is the Universe Mathematical? In: La Nuova Civiltà delle Macchine, Anno VIII, N.4(32) 1990.
- BENSTON, M.L. (1989), Feminism and System Design: questions of control. In: Winnie Tomm (ed.) *The Effects of Feminist Approaches on Research Methodologies; CIH, the Calgary Institute for the Humanities, Calgary*
- BENVENUTI, B. (1984), Il tecnico consulente - i problemi di formazione e scientificizzazione dell'agricoltura. In: *L'Italia Agricola, Aprile-Giugno 1984.*
- BENVENUTI, B. (1987), Gli effetti inattesi della scientificizzazione del patrimonio conoscitivo professionale del produttore agricolo; *La Questione Agraria, 25, 1987.*
- BENVENUTI, B. (1989), The Autonomy issue in Commercial Western Farming and the emerging of .TATE. In: E. Poutsma and A. Walravens (eds.) *Technology and Small Enterprises - technology, autonomy and industrial organisation, Delft University Press, Delft*
- BENVENUTI, B. (1991), *Geschriften over landbouw, structuur en technologie. LUW, Wageningse sociologische studies 29, Wageningen, 1991*
- BENVENUTI, B. (1991), Towards the formalisation of professional knowledge in farming: growing problems for Agricultural Extension? Proceedings of the International Workshop "Agricultural Knowledge Systems and the role of Extension", Bad Boll, 21-24 May 1991, University of Hohenheim
- BENVENUTI, B. (1992), Evoluzione o Rivoluzione Tecnica oppure Evoluzione e Rivoluzione Tecnica? Convegno Internazionale "Biotecnologie e Agricoltura: evoluzione o rivoluzione tecnica? Roma 28-29 /05/1992
- BENVENUTI, B. et al.. (1992), Produttore Agricolo e Potere; CNR/IPRA, Roma
- BENVENUTI, B. en H. MOMMAAS (1981), De Technologisch-Administratieve Taakomgeving van Landbouwbedrijven - een onderzoeksprogramma op het gebied van de economische sociologie van de landbouw; Afdelingen voor Sociologie van de LH; Wageningen
- BUNGE, M. (1991), Una caricatura de la ciencia: la novísima sociología de la ciencia; *INTERCIENCIA, Mar-Apr. 1991, Vol 16, n.2.*
- GRANGER, G.G. (1967), *La Raison Presses Universitaires de France*
- KLOPPENBURG Jr., J. Alternative agriculture and the new technologies. In: .... Science as Culture, (further references unknown)
- KLOPPENBURG Jr., J. (1991), Social theory and the de/reconstruction of agricultural science; *Rural Sociology, 1991, 57:519-48*
- KLOPPENBURG Jr., J. (1992), Science in Agriculture: A reply to Molnar, Duffy, Cummings, and Van Santen and to Flora; *Rural Sociology, Spring, 1992*
- MARGLIN, S.A. (1991), Two essays on agriculture and knowledge. Essay I, High-tech agriculture: a system of knowledge perspective; Essay II, Alternative agriculture: a system of knowledge approach; Harvard University and World Institute of Development Economics Research
- MOLNAR, J., P.A. DUFFY, K.A. CUMMINGS and E. VAN SANTEN (1992), Agricultural science and agricultural counterculture: paradigms in search of a future. *Rural Sociology 1992, 57*
- PLOEG, J.D. VAN DER (1990), *Labor, Markets and Agricultural Production; Westview Special Studies in Agriculture Science and Policy; Westview Press Inc.*
- PLOEG, J.D. VAN DER et al.. (1990), *Bedrijfsstijlen in de Zuidhollandse Veenweidegebieden. LUW Wageningen*
- PLOEG, J.D. VAN DER et al.. (1991a), *Maat Houden. LUW, Wageningen*
- PLOEG, J.D. VAN DER et al.. (1991b), *Zicht op Duurzaamheid en Continuïteit. LUW, Wageningen*
- PLOEG, J.D. VAN DER et al.. (1991c), *Niet Klein te Krijgen. LUW, Wageningen*
- PLOEG, J.D. VAN DER et al.. (1992a), *Toppers en Tuinders. LUW, Wageningen*
- PLOEG, J.D. VAN DER et al.. (1992b), *Boer Bliuwe, Blinder. LUW, Wageningen*

RUIVENKAMP, G. (1992), Taylor made biotechnology: the possibilities for a farmer centered development; Convegno Internazionale *Biotechnologie e Agricoltura: evoluzione o rivoluzione tecnica?*, Roma, 28-29/05/1992

SODANO, V. (1992), Incentivi all'integrazione verticale in agricoltura e forme di organizzazione del sistema alimentare; Studi di Economia e Diritto, Cagliari, 1992/2

## APPENDIX I

*Some reflections about scientific reductionism and the agrarian question*

The text of my paper expresses the opinion that the number of self-perceived and self-labelled 'progressive' scientists practising reductionism is probably quite deceptively high. I am aware that this formulation might sound irritating to those who - having never even thought of such a possibility in connection with themselves - prefer to skip over the epistemological level of their own disciplinary practice altogether. But a sore truth is that reductionism is not monopolised by the conscious partisans of a Top Dogs-Perspective (be it of a right- or left-wing type). If for example it applies quite visibly to the die-hard structuralists and canonical Leninists among the various shades of Marxian social thought.

However, in their case I am not implying any strict causal bond between the two - on this occasion the correspondence is most probably due to reductionism automatically suiting better all dogmatic and technocratic thinking. But it is not limited to such thinking; and here the discourse should decidedly acquire more nuance.

Being mostly associated with a 'constructionistic' conception of science, reductionism is for example, frequently recognizable amongst well intentioned extensionists, 'change agents', communicators, rural animators and rural leaders motivated to have the local situation 'move ahead'.

No matter how important the theme of reductionism may be, and how almost collateral with the topic of the main paper, it remains impossible to see the two as identical, 'reducing' thus the one to the other. However, long experience shows me that the fear of applied scientist to engage in 'abstract', 'theoretical' (or worse: 'philosophical') problems often renders them unexpected - unknowing but not innocent - collaborators of the social forces (that they see) oppressing or curtailing those in whose favour they believe themselves to be operating. The various Western Departments for International Cooperation actually thrive on this sort of 'halved' scientist.

I think it is fair to say that - at least at an applied level of professional activity - the present techno-sciences are not primarily interested in 'explaining' deeds and situations of the phenomenological world, their endeavour, instead, primarily aims at the construction of new realities. Therefore the technocrat - be she/he a natural or a social scientist in a disciplinary sense - is only as an exception, interested in explaining local specificities with their possible variations and/or in understanding their nature and reason. They do not have enough of an eye for the 'whys' of such things. And the explanations they give are mostly of a well known stereotypical sort. Generally these come down to remnants of past historical situations, or 'deviations' from scientifically based or constructed models.

The practice of employing models in scientific work has also become, of late, more and more general in the social sciences. In the most pronounced positivistically influenced cases of scientific constructionism, the scientist faces the situation or object of study as either 'fitting' or as 'non fitting' the model - there being no third possibility in this procedure. And this amounts to a first reductive step.

A second step in the same direction is taken (albeit indirectly) whenever a case under study 'fits' the model and is - *therefore* - automatically also perceived of /declared to be 'rational', while the opposite case is deemed to be, 'hence', non-rational. However, the empirical world is entirely a blend of forms (some 'pure', some less so), transitions amongst forms, nuances, adaptations, etc. And who decrees what is 'pure'? Of course the scientist's model.

So far so good, for there is no other way to solve the task of perception.

But the problems begin at this point. In fact the (modern) scientist's model is likely to be based on formal reasons. Yet in itself the formal reason is no longer interested in the specificity of the object as such: it is a form without content, and a mechanism without a programme. The functioning of contentless Reason cannot teach us the significance of a truly rational activity (Granger 1967).

A few significant problems related to this methodological state of affairs can be synthesized as follows:

1. The growing production of a techno-scientific output following a 'verification' (i.e. the materializing of something that thus far had existed, if at all, only in the form of a possible blueprint) of purely formal-instrumental models of thought, may increase the number of new objects made available to mankind; but it says nothing as to the rationality as such of the construct or of the activity in question;

2. Today most scientific disciplines show a strong tendency (develop strong internal pressures) to extend the formalisation process to the whole of their disciplinary body. However, through this formalistic illusion or epidemic, the concerned scientist gives a substance self-constructed structures, forgets the operations through which such structures came into being, and comes therefore to a deformation of human reality.

So much for the first and the second reductionist steps. But there are more steps possible, because reductionism is not inherent in the use per se of models, but in the way of going about these.

3. In fact, in the domain of human facts, structures, settings, etc., there exist local epistemologies. Scientifically constructed models can be employed in order to express, chart and make explicit such different epistemologies (or alternatively: their most significant reciprocal differences, etc.). This happens when the (sensitive and skilled) research worker endeavours to maximise the 'fidelity' of his model vis-à-vis the object of study in order to obtain a 'respectful description' of the situation. Another non-reductionist usage of models is obtained when this technique is employed, for example, to amplify the number of possible options accessible to actors of a given local epistemology.

But today, scientific models are actually mostly not used to perceive - *let alone* respect - local universes of meaning. They serve, on the contrary, to bypass, force, correct, and change these local universes of meaning so as to have them substituted by heterogenous and heteronomous 'projections' of something (whereby the concept of "descriptive model" too can be reduced to a Jack-of-all-trades instrument).

4. Such a third reductionism is almost immediately followed by a fourth and more subtle one. In fact, the first type of models (the orthodoxly descriptive sort), in as far as it is meant to be a faithful reproduction of something, becomes an instrument of knowledge

and insight for the actors concerned, as well as for possible third parties, in the same way as a Frans Hals' portrait or an old Dutch landscape by Hobbema are also a source of insight into the nature of the object portrait. However, the second type of models does not intend so much to further knowledge about its own object of attention, but rather "to do" something, to begin with - a something which the model proposes, not necessarily through a parallel furnishing of adequate instruments for that goal (which is a step further than the former case).

What consequences can be drawn from what has been said so far in this Appendix? Generally speaking, reductionist (usages of) scientific models are an attempt and a procedure to guarantee the validity of the expected results through the possibility to execute automatically a series of step-by-step elementary operations. In fact, the ideal result to which *de facto* such usage is inspired in its idealtypical form consists in the fictive construction of a sort of symbolic machine, which by the way is, or corresponds to, the significance of the present trend at axiomatizing and formalizing the scientific knowledge following mathematical algorithms) (Granger op cit.).

However, a machine built that way can only result in a verifying sort of tool. And this is, what massively happens *de facto* at the applied level by adapting praxis to the verifying machine/ model, instead of having the machine verify (support, strengthen, etc.) local epistemologies. But an efficient reason, that is a reason which creates scientific knowledge, is not formal. Such reason is *the constructor* itself of formalisms (which guides the application, interprets and controls the results) being as such a far more primogenous and fundamental structuring element.

Unfortunately, the gradual substitution of creative thinking in everyday life by ritualized axiomatization and formalization of knowledge - such as obtained at our down-to-earth institutional systems of professional instruction - actually amounts to the annihilation of an unknown source of new potentialities, for the latter are being currently sacrificed on the altar of a stricter streamlining of the Agro-Industrial System in the attempt to govern a rapidly increasing complex reality. Hence, science constructs anew formalisms of a second degree, a material or conceptual machinery in order to verify formalisms of a lower order.....

However, this process cannot be repeated indefinitely: the potentiality of formalism as such gets lost (neutralizes itself) in this repetitive exercise. Then, the intended streamlining emerges as (becomes) an uncontrollable surplus of complexity.